LLNL Environmental Restoration Division (ERD)
Standard Operating Procedure (SOP)

ERD SOP 2.3: Sampling Monitor Wells with Bladder Pumps, Electric Submersible Pumps, and Specific-Depth Grab Sampling Devices—Revision: 5

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1.0 PURPOSE

The purpose of this SOP is to describe the procedure for sampling wells with bladder pumps, electric submersible pumps, and specific-depth grab sampling devices and to ensure that ground water samples are obtained in a credible, uniform, and well-documented manner when using these devices. It assumes the well has been properly purged according to SOP 2.1, "Pre-sample Purging of Wells." A brief description of sampling devices, and the installation thereof, is given in SOP 2.8, "Installation of Dedicated Sampling Devices."

2.0 APPLICABILITY

This SOP applies to all field personnel involved in operating dedicated and/or portable electric submersible pumps, bladder pumps, or specific-depth grab sampling devices, etc. used during ground water sampling events.

3.0 REFERENCES

3.1 deVera, E. R., B. P. Simmons, N. D. Stephen, and D. L. Storm (n.d.), *Samplers and Sampling Procedures for Hazardous Waste Streams*, U.S. EPA, Washington, D.C. (EPA-600/2-80-018).

3.2 Ford, P. J., P. J. Turina, and D. E. Seely (1984), *Characterization of Hazardous Waste Sites—A Methods Manual, 302. Vol. II of Available Sampling Methods,* 2nd ed., U.S. EPA, Washington, D.C. (EPA-600/4-84/076).

3.3 Korte, N. and D. Haley (1983), *Procedures for Field Chemical Analyses of Water Samples,* U.S. Department of Energy, GJ/TMC-07, Technical Measurements Center, Grand Junction Project Office, Grand Junction, Colo.

3.4 Korte, N. and P. Kearl (1985), *Procedures for the Collection and Preservation of Groundwater and Surface Water Samples and for the Installation of Monitoring Wells,* Second Edition, U.S. Department of Energy, GJ/TMC-08, Technical Measurements Center, Grand Junction Projects Office, Grand Junction, Colo.

3.5 Morse, S. I. (1997), San Francisco Bay Regional Water Quality Control Board, Toxics Cleanup Division; letter to Interested Parties. Subject: *Utilization of Non-Purge Approach for Sampling of Monitoring Wells Impacted by Petroleum Hydrocarbons, BTEX, and MTBE,* File: 1123.64, January 31, 1997.

3.6 Robbins, G. A., and J. M. Martin-Hayden (1991), Mass Balance Evaluation of MonitoringWell Purging: Part 1. Theoretical Models and Implications for Representative Sampling," *J. Contam. Hydrol.* 8, 203–224.

3.7 Schilling K. E. (1995), Low-Flow Purging Reduces Management of Contaminated Groundwater, *Environmental Protection*, December 1995.

3.8 U.S. Department of the Interior (n.d.), *National Handbook of Recommended Methods for Water-Data Acquisition*, Washington, D.C.

3.9 U.S. EPA (1983), *Methods for Chemical Analysis of Water and Wastes,* Washington, D.C. (EPA-600/4-79-020).

3.10 U.S. EPA (1985), *Practical Guide for Groundwater Sampling*, Washington, D.C., (EPA-600/2-85/104).

3.11 U.S. EPA (1986), *RCRA Groundwater Monitoring Technical Enforcement Guidance Document,* Washington, D.C. (OSWER-9950.1).

3.12 U.S. EPA (1992) *RCRA Groundwater Monitoring: Draft Technical Guidance*, Washington, D.C. (EPA/530-R-93-001).

3.13 U.S. EPA (1994), *Test Methods for Evaluation of Solid Waste,* Third Edition, Washington, D.C. (EPA-SW-846).

3.14 U.S. Environmental Protection Agency (EPA) (1995), Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, *Ground Water Issue*, EPA/540/S-95/504.

3.15 U.S. Environmental Protection Agency (EPA) (1995), *Use of Low-Flow Methods for Ground Water Purging and Sampling: An Overview*, Quick Reference Advisory (December 1995).

4.0 DEFINITIONS

See SOP Glossary.

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

The field personnel are responsible for the safe completion of evacuating and sampling ground water monitor wells according to guidelines set forth by this procedure and associated SOPs.

5.3 Field Support Personnel

The field support personnel's responsibilities are to provide the appropriate equipment, collection devices, and general field support to assure that field activities are performed in a timely and efficient manner. Field support personnel are also responsible for adhering to all appicable ERD SOPs.

5.4 Sampling Coordinator (SC)

The SC's responsibility is to supply a quarterly Sampling Plan. In addition to providing a quarterly Sampling Plan, the SC may provide a specific sample plan for each day (Daily Operations Guide [DOG], SOP 2.1, Attachment A). The technical information required for purging wells may also be provided by the SC in the Well Specification Table, Technical Information Spreadsheet or as part of electronically generated Ground Water Sampling Data Sheets.

6.0 PROCEDURES

6.1 Preparation

6.1.1 Prior to commencement of field activities, perform preparation activities described in SOP 4.1, "General Instructions for Field Personnel." Personnel shall review the appropriate Site Safety Plan (SSP), and all applicable SOPs, Operational Safety Procedures (OSPs), and Integratation Work Sheets (IWSs). Current copies of all appropriate documents shall be retained by the field personnel.

6.1.2 Review all pertinent sampling information such as the quarterly Sampling Plan, Well Specification Table, and electronically generated Ground Water Sampling Data Sheets (SOP 2.1, Attachment C) provided by the SC. The plan contains the following information:

- Locations to be sampled.
- Proposed sampling methods (See SOP 2.1, Attachment B, Methodology Sampling Codes).
- Requested analyses.
- Contract analytical laboratory (CAL) to which samples are to be sent for analyses.
- Estimated amount of purge water to be collected.
- Current technical information for each well.

6.1.3 Obtain appropriate data collection forms i.e., Chain-of-Custody (CoC) forms, Ground Water Sampling Data Sheets (SOP 2.1, Attachment C), assigned Document Control Logbook, labels, and any necessary shipping forms. Instructions for completing the logbook entries and field forms are provided in SOP 4.2, "Sampling Control and Documentation."

6.1.4 Compile all necessary equipment and instrumentation for sampling according to Attachment D, Equipment Checklist in SOP 2.1.

6.1.5 The appropriate number and type of sample containers needed for the sampling event should be obtained from the sample bottle inventory. The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirement. See SOP 4.3, "Sample Containers and Preservation."

6.1.6 The appropriate personnel should keep a sufficient stock of sample containers and maintain an inventory of supplies (i.e., disposable 0.45 µ fiber filters, trip blanks, field blank water (ordered from the contract analytical laboratory (CAL), plastic bags, etc.), to ensure adequate sampling supplies are available at all times.

6.1.7 The Livermore Site SC or appropriate personnel coordinates the samples and analytical labs as planned. The Site 300 field personnel notifies the SC when collecting samples with short holding times (e.g., hexavalent chromium, fecal and total coliform). When samples are collected, the SC or appropriate personnel informs the CAL ahead of time to allow for preparation.

6.1.8 The Administrative Escort Services must be given a 24-hour notice before work is scheduled in restricted areas. If appropriate, arrange access to sampling areas through the Facility Point of Contact (FPOC) or the control point Operator per SOP 4.1, "General Instructions for Field Personnel."

6.1.9 Routine maintenance of ground water monitor wells and equipment such as generators and well-wizard controllers should be performed on a quarterly basis, when possible as deemed by SOP 2.12, "Ground Water Monitor Well and Equipment Maintenance." Prior to usage in the field, assigned sampling personnel should check equipment for cleanliness, proper operation, and ensure that the batteries are charged and the fittings are secure. Use gloves when handling compressors and generators, and dispose of them immediately to avoid possible sample contamination.

6.1.10 Fill out initial information on the Ground Water Sampling Data Sheet and Document Control Logbook per instructions in SOP 4.2.

6.1.11 Organize sampling route.

A. Site 300

1. Complete an entire study area before beginning the next, when possible.

3. Sample wells working from the least contaminated to the most contaminated, when possible.

B. Livermore Site

The Livermore Site SC may specify the order of well sampling. The Livermore Site contains overlapping study areas which are not hydrogeologically isolated. When working with portable equipment, sample wells from least to greatest contaminant levels, as directed by the SC.

6.2 Purge Water Collection

6.2.1 At Site 300, the field support personnel must ensure that wells have sufficient collection drums available at the well head for purge water containment (SOP 4.7B, "Site 300 Treatment and Disposal of Well Development and Well Purge Fluids"). The quantity of purge water to be collected for each well is listed in the quarterly Sampling Plan or calculated by the SC for newly installed monitor wells.

6.2.2 The Livermore Site field personnel will tow a collection tanker with the sampling vehicle and when necessary, the SC may provide a specific order of wells to be sampled. Tankers and drums filled with purge water may not be left at the well location and will be logged and disposed of daily, when possible according to SOP 4.7A, "Livermore Site Treatment and Disposal of Well Development and Well Purge Fluids."

6.3 Operation

6.3.1 Once pre-sample purging is complete according to SOP 2.1, sampling may begin. Wear new disposable gloves during sampling. According to SOP 2.2, "Field Measurements on Surface and Ground Waters," temperature, pH, and specific conductance should be measured immediately prior to sampling. Instruments should be calibrated according to SOP 4.8, "Calibration and Maintenance of Field Instruments Used in Measuring Parameters of Surface and Ground Water and Soils."

6.3.2 Refer to the operators manual for additional instructions on operating specific types of equipment.

6.3.3 Monitor wells are sampled from the discharge tubing immediately after the final field measurements are taken (after presample purging, if applicable). When sampling for analytes that require filtration, a disposable 0.45 μ fiber filter in a plastic housing can be inserted into the discharge tubing. If using a bladder pump, decrease the pump pressure so the pressure buildup does not blow out or rupture the filter. If samples requiring filtration are not field filtered, the analytical lab will filter the sample upon receipt when requested (Refer to SOP 2.4, Section 6.5.6). Samples collected by other methods (methods in which an inline filter is not feasible) will need to be filtered by the CAL.

6.3.4 Collect samples directly in containers as specified in SOP 4.3, "Sample Containers and Preservation." If sampling for volatile organic compounds (VOCs), refer to SOP 2.6, "Sampling for Volatile Organic Compounds." Fill the appropriate sample containers by allowing discharge to flow gently down the side of the bottle with minimal entry turbulence. The flow should not be excessive, but the sample should be obtained in a timely manner (SOP 2.6). Do not allow the discharge tube to come in contact with the sample container.

6.3.5 Samples should be obtained in order of volatility; VOCs collected first, followed by semi-VOCs, inorganics, and radiologicals. All samples should be placed in airtight plastic bags. The samples requiring preservation of 4°C should be cooled by using blue ice packs in airtight plastic bags or bagged ice cubes. Loose ice may be used when samples need to be rapidly cooled, but should be replaced with bagged or blue ice before shipping.

6.4 Post Operation

6.4.1 Perform post operation activities per SOP 4.1.

6.4.2 Before leaving the sampling location, verify that the appropriate samples have been collected according to the samples scheduled on the Ground Water Sampling Data Sheets.

6.4.3 Prior to sampling another site and to prevent cross contamination of equipment between locations, thoroughly decontaminate all equipment that is not dedicated according to SOP 4.5, "General Equipment Decontamination."

6.4.4 Complete the appropriate Ground Water Sampling Data Sheet and record sampling information in the assigned Document Control Logbook (SOPs 2.1 and 4.2).

6.4.5 Verify that the CoC is appropriately completed per SOP 4.2. Indicate any special instructions in the Remarks Section of the CoC. Such instructions may include a request for the laboratory to filter and preserve the sample upon receipt. Also, for wells that are listed on the sampling plan as Clean Wells or for any well that is expected to be free of contamination write, "Verify any positive detections and call _____." The blank should be filled in with the appropriate QC Chemist's name and phone number.

6.4.6 Deliver Ground Water Sampling Data Sheets and CoC forms to the SC daily. Hand carry or mail copies of the completed CoCs to the Technical Release Representative (TRR) daily.

6.4.7 The SC will retain a copy of the original forms (CoC, Ground Water Sampling Data Sheets), and provide the originals to the Data Management Team (DMT) for final archive. The SC will provide copies of the forms to the appropriate Operations and Regulatory Affairs Division Analyst, as necessary.

6.4.8 Leave routine samples and proper documentation in the environmental sample lock-box for the CAL. Field personnel will ship samples and/or distribute to the appropriate laboratories. Ensure that the samples requiring refrigeration remain at 4°C ± 2°C, but do not allow them to freeze. Always ensure that proper chain of custody is maintained.

7.0 QA RECORDS

7.1 Ground Water Sampling Data Sheets

7.2 Document Control Logbooks

7.3 Chain-of-Custody Forms

8.0 ATTACHMENTS

Not applicable.